MOVES2010a and MOVES2010b on Linux Cluster

Virginia Department of Environmental Quality

MARAMA MOVES Workgroup conference call
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Background

- **MOVES2010a**

  MOVES2010a (released in September 2010)
  updated from MOVES2010 (released in December 2009)

- **MOVES2010b**

  MOVES2010b (released in April 2012)
  minor revision, usage not mandatory

VADEQ has previously installed MOVES2010a on a Linux cluster located at Virginia Tech

MOVES2010b Installation

- **Follow MOVES2010a framework**
- **Adhere to MOVES2010b Windows guidelines**

  a. MySQL 5.5.12

  b. JDK 1.7.0

- **Co-exist MOVES2010a/MOVES2010b**

package	MOVES2010a	MOVES2010b
MySQL	5.5.9	5.5.12
JDK	1.6.0	1.7.0

Linux Installation

■ **Dedicated TCP ports**

      MOVES2010**a** assigned to **3307**

      MOVES2010**b** assigned to **3306** (default)

■ **Configurations**

      In MOVESConfiguration.txt:

        defaultServerName = localhost:3306 (or 3307 for MOVES2010a)

        executionServerName = localhost:3306 (or 3307 for MOVES2010a)

        outputServerName = localhost:3306 (or 3307 for MOVES2010a)

      all three incidences must be edited, else outputs get sent to wrong version!

■ **MySQL Access**

      Use .my.cnf in user home directory to control/switch/access two MySQL

      File is necessary only when get into MySQL. MOVES run does not need the switch.

■ **Other Issues**

      -- User must be able to write to MySQL

      -- MySQL must be able to write to MOVES installation folder

      -- GUI installation step will fail unless JDK is 1.7.0

      -- setenv.sh must be derived from equivalent Windows version (setenv.bat)

       b/c version number of mysql-connector-java has changed.

Cloud Computing

■ **Distributed Processing**

  Take advantage of multiple MOVES installed on multiple machines to reduce run time

■ **MOVES/MySQL**

  -- Six MOVES have been installed on six nodes on Linux cluster

  -- MOVES and MySQL were (and should be) both installed on "local" (not network) drives

■ **Share Folder**

  -- on master node, create a folder "seen" by all nodes

  -- change its read/write permissions (chmod o+w granting permissions to "others")

  -- hold TODO intermediate files

Cloud Computing (cont.)

■ **Share Folder Path**

Point "SharedDistributedPath" in <u>MOVESConfiguration.txt</u> and <u>WorkerConfiguration.txt</u> to the share folder being created

■ **Model Run**

-- Activate all participating workers first

-- Launch MOVES run on master node as usual

-- Watch in GUI of participating nodes TODO being worked on

■ **Windows Setup**

The same concept can be applied to Windows MOVES

Test Run Comparison

Sample test run:

- Inventory mode for a July 2008 weekday in Accomack County (51001), VA
- Run spec includes all road types, diesel/gasoline vehicles, CNG buses, emissions by SCC and emission process
- MOVES default databases applied, results re-producible.

Criteria Pollutants Comparison

Platform Model	runtime	CO (lb)	NO (lb)	NO2 (lb)	HONO (lb)	VOC (lb)	PM2.5 (lb)
Windows MOVES2010a	45 min	23958.07	4673.29	444.96		2097.76	142.99
Windows MOVES2010b	45 min	23958.07	4673.29	404.02	40.95	2097.76	142.99
Linux MOVES2010a	25 min	23958.14	4673.30	444.96		2097.77	142.99
Linux MOVES2010b	25 min	23958.14	4673.30	404.02	40.95	2097.77	142.99
Linux ** 2010b (cloud)	16 min	23958.14	4673.30	404.02	40.95	2097.77	142.99

MOVES2010a: NOx = NO + NO2   (HONO is speciated in SMOKE-MOVES)

MOVES2010b: NOx = NO + NO2 + HONO   (HONO is speciated in MOVES)

NO   (MOVES2010a) = NO (MOVES2010b)

NO2 (MOVES2010a) = NO2 + HONO (MOVES2010b)

** cloud computing used one master and two worker nodes

Summary

- **MOVES2010a and MOVES2010b have been installed successfully**
- **Both MOVES are equipped with cloud computing capability**
- **MOVES2010a and MOVES2010b estimate nearly identical criteria pollutants**
- **Differences between Linux and Windows versions are minor**
- **Cloud computing shortens run time**

Future improvement??
MOVES has internally specified a TCP port. Therefore, while MOVES2010a and MOVES2010b can co-exist, they cannot be run concurrently. Only one MOVES run, either a or b, can be conducted at a time.